BIRD

Racal Mobilcal Ltd.
Test Equipment Maintenance Department
Location:- D1
ID 0314

INSTRUCTION MANUAL for

TERMALINE®
model 8401
Coaxial Load Resistor

INSTRUCTION MANUAL

for

Model 8401

Coaxial Load Resistor

SPECIFICATIONS

Frequency Range	DC to 3000 MHz
VSWR	1.1:1 max dc to 1000 MHz 1.25:1 max to 3000 MHz
Input Impedance	50 ohms nominal
Load Power Rating	600 watts continuous
Ambient Temperature Range	-40° C to +45° C
Weight	19.6 pounds
Overall Dimensions	16-1/16" l x 5-15/16" w x 8-1/2" h
Operating Position	Horizontal only

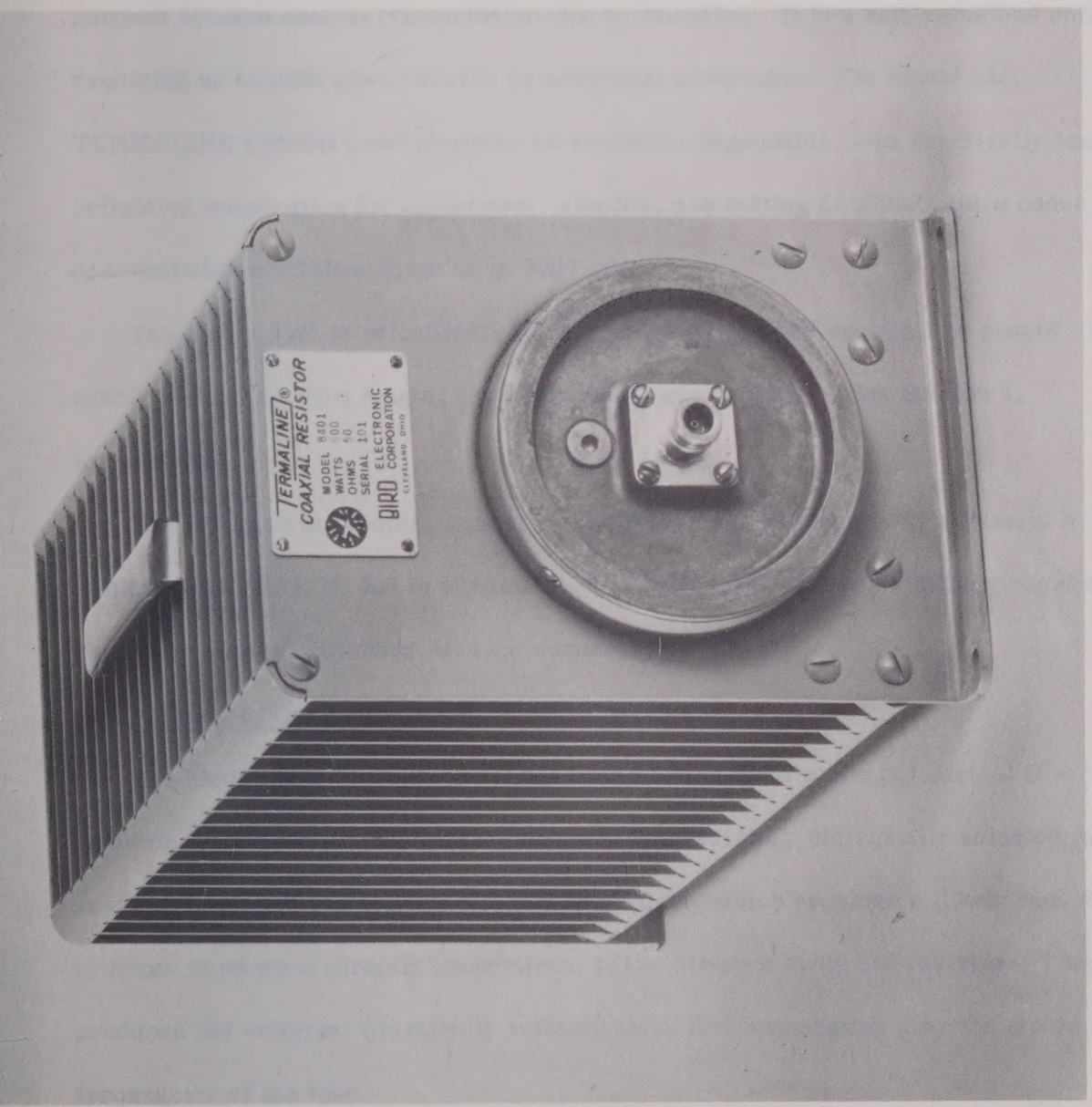

Figure 1-1. Model 8401 TERMALINE Coaxial Load

SECTION 1

GENERAL DESCRIPTION

1-1. General

The Bird Model 8401 TERMALINE Load Resistor is a portable, general purpose 50-ohm coaxial transmission line termination. It is a self-contained unit requiring no outside power source or additional equipment. The Model 8401 TERMALINE Coaxial Load provides an accurate, dependable, and practically non-reflective termination for adjustment, standby, and testing of transmitters under non-radiating conditions from dc to 3000 MHz.

The Model 8401 is rectangular in shape with transverse cooling fins spaced evenly along its entire length. Mounting holes are provided. See Section 2, Installation.

The RF input connector, located on the front face of the unit, is a Female N similar to UG-58A/U, but is a patented "Quick-Change" design permitting rapid and easy interchange with other AN type connectors.

1-2. Theory of Operation

The Model 8401 TERMALINE Load consists essentially of a cylindrical film type resistor immersed in a dielectric coolant. The resistor, individually selected for its accuracy, is enclosed in a special tapered housing which provides a linear reduction in surge impedance directly proportional to the distance along the resistor. This produces the uniform, practically reflectionless line termination over the stated frequencies of the load.

The dielectric coolant is chosen for its desireable dielectric properties and thermal characteristics. Cooling of the Load is accomplished by natural fluid

and air convection. The dielectric coolant carries the electrically generated heat from the resistor to the walls of the cylindrical cooling tank. The tank is encased in a set of heavy gauge metal radiating fins, which are firmly pressed on the cylinder. The heat from the dielectric oil is transferred to the surrounding air by the radiating fins.

A synthetic rubber diaphragm located in the rear dome of the Load allows the coolant to expand as the temperature rises.

SECTION 2

INSTALLATION

Locate the Model 8401 TERMALINE Load Resistor to provide at least six inches of free space around and above the unit. Place the Load to permit the shortest possible cable length between the unit and the transmitting equipment.

Operate the Model 8401 in a horizontal position only, with the handle on top. The Load may be free-standing on any convenient flat surface. The front and rear fins are made extra thick and bent outward 90^{o} to form mounting flanges. Fasten the Model 8401 by its mounting brackets with 1/4" machine screws and nuts or #12 wood screws if desired. The four 5/16" holes in the mounting brackets form a base rectangle of 14-5/8 by 5-1/8 inches.

SECTION 3

OPERATION

Connect the Model 8401 TERMALINE Load to the transmitting equipment under test with 50-ohm coaxial cable such as RG-213/U or equal, and a Male N Type plug (UG-18E/U or equal) which mates with the RF input connector of the Load. After the transmitter has been connected to the Load, proceed according to the transmitter manufacturer's instructions. When reconnecting the antenna, it may become necessary to retune the transmitter due to possible differences in VSWR.

CAUTION

DO NOT operate this equipment over the rated 600 watts continuously.

SECTION 4

TROUBLESHOOTING

4-1. Periodic Inspection

With the rugged and simple construction of the Model 8401 TERMALINE Load, periodic inspection will be necessary at only about six month intervals. Inspection should include the items listed below:

a. Oil Leakage. Check for coolant oil seepage around the radiator tank, and particularly at the front and back around the under side of the clamping band. See paragraph 4-2, Troubleshooting Chart if leakage is observed. Check tightness of the clamping screw and the fasteners around the front cylinder.

b. DC Resistance. Check the condition of the load resistor by accurate measurement of the dc resistance between the inner and outer conductors of the RF input connector. Use a resistance bridge with an accuracy of one percent or better at 50 ohms (such as the Leeds & Northrup 5305 Test Set). The measured resistance should be a nominal 50 ohms, ± 2 ohms.

c. Inspect the Model 8401 TERMALINE for completeness and general condition of the equipment.

4-2. Troubleshooting Chart

The troubleshooting chart on the following page lists the symptoms of commonly encountered troubles, causes, and suggested corrective measures. Use this chart as a guide when anaylizing symptoms.

Symptoms	Causes	Remedy
Leakage of coolant oil around clamping band or radiator housing.	Clamping bands not tight.	Tighten slightly with a screwdriver.
	Faulty O-ring (front).	Replace per paragraph 5-2c.
	Faulty diaphragm (rear).	Replace per paragraph 5-2b.
Excessive overheating of the radiator.	Transmitter power too high.	Reduce transmitter power
	Coolant oil level too low.	Add more coolant oil to the radiator per paragraph 5-2b.
	Faulty RF Section Assy.	Replace per paragraph 5-2c.
High or low dc resistance values per par. 4-1b.	Faulty RF input connector.	Replace per paragraph 5-2a.
	Loose RF input connector.	Tighten with a screwdriver.
	Faulty RF Section Assembly.	Replace per paragraph 5-2c.
	Coolant oil level too low.	Add more coolant oil to the radiator per paragraph 5-2b.

SECTION 5

MAINTENANCE

5-1. Operator's Maintenance

The principle maintenance required by the operator will be the cleaning of the RF input connector. If the insulator or metallic contact surfaces of the connector should become dirty or grimy, clean carefully with a dry cleaning solvent such as trichlorethylene on a cotton swab stick. Keep the radiator of the Model 8401 TERMALINE Load clean and free of dust.

CAUTION

Prolonged breathing of dry cleaning solvents is dangerous. Make certain adequate ventilation is provided.

If any portions of the radiator are corroded or rusted, clean the area with a fine flint sandpaper, and touch up with gray enamel.

5-2. Repairs

There are no special techniques required for the repair or replacement of components in the Model 8401 TERMALINE Load. A screwdriver is the only tool needed. The paragraphs below outline component removal.

a. RF Input Connector Replacement. The input connector is a patented "Quick-Change" design which permits easy interchange with the use of only a screwdriver. This process does not interfere with the essential coaxial continuity of the load resistor RF input of the coolant oil seal. For replacement, proceed as follows:

(1) Remove the four #8-32 x 5/16" round head machine screws from the corners of the RF connector.

(2) Pull the connector straight out of its socket.

(3) Reverse the above procedure to install new connector. Be sure that the projecting center contact pin on the connector is carefully engaged and properly seated with the mating socket of the load resistor input.

b. Diaphragm and Coolant Oil. Remove the diaphragm to replace or examine the coolant oil. Replacement of the diaphragm and coolant oil are listed in the steps below.

(1) Stand the Load vertically, with the back end up.

(2) Loosen the clamp screw until the clamping band is released.

(3) Remove the diaphragm cover and lift the diaphragm from the back end of the radiator tank.

(4) The coolant oil level should be about one inch below the top of the radiator cylinder. If the oil appears to be contaminated, replace.

(5) To reassemble, reverse the above procedure.

c. RF Load Resistor Assembly. To replace the load resistor assembly, first remove the diaphragm and coolant oil per paragraph b above, and proceed with the steps below.

(1) Pour the coolant oil into a CLEAN container.

(2) Set the Load on its mounting feet.

(3) Loosen and remove the four 8-32 x 5/16" oval head machine screws from around the cylinder (RF input connector end).

(4) With one hand, hold the Load Assembly by the RF input connector; using the other hand, push the Assembly (from inside the radiator housing) out of the radiator.

(5) Inspect the O-ring seal which is located just inside the mounting flange of the Resistor Assembly. Do not re-use the O-ring if deteriorated.

(6) To replace the Assembly, reverse the above procedure, guiding the RF Section from inside the radiator.

TABLE 5-1. REPLACEMENT PARTS LIST

NAME AND DESCRIPTION	LOCATING FUNCTION
RADIATOR, Cooling: Rectangular shape 15-1/4" lg x 5-15/16" w x 8-1/2" h Transverse vertical fins at 5/8" intervals to central tank. Al alloy, Gray enamel, Bird p/n 244001.	Houses RF load resistor and dielectric coolant.
RF SECTION ASSY: Tapered and slotted coaxial line with 50 ohm load resistor center conductor. 4-1/2" dia x 14-1/4" lg. Copper alloy. Bird p/n 840102.	Housed in radiator, non-reflecting terminator for RF Power.
COOLANT: Hi-temperature dielectric oil. Bird p/n 5030.	Contained in radiator.
CONNECTOR, RF Input: Female Type N 47/64" lg with 1-1/4" square mounting flange. Four 3/16" mounting holes on 15/16" square. 5/8-24 thread. Brass nickel plate. Bird p/n 424062	Female N RF input connector on front face of unit
CLAMP BAND: 4-5/8" OD x 1/4" V-band with two clamping blocks (one threaded) and 10-32 x 1-1/2 Fil HMS. Stainless steel, gray nickel plate Bird p/n 24355.	Holds diaphragm to radiator.
CAP, Dust: 3/4" dia x 9/16 lg overall 5/8-24 threads. Brass, Nickel plate. Bird p/n 5297.	Dust protector for connector
O-RING Seal: 3-3/4" x 1/8" nominal Synthetic rubber. Bird p/n 5453	Seal for coolant oil
DIAPHRAGM: 4-3/8: x 1-1/2" nominal. Synthetic rubber. Bird p/n 24315.	Expansion bellows for oil
COVER, DIAPHRAGM, 4-7/16" x 25/32" nominal. Bird p/n 24335.	Protective cover for diaphragm.

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